



Risk of sharp injuries and mucocutaneous exposures in healthcare workers: ongoing problem despite prevention programs

Sharp injuries and mucocutaneous exposures

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Abstract

Aim: The fact that documented cases of sharp injuries and mucocutaneous exposures are still occurring is a reminder of the importance of preventing injuries and of providing services for the prompt and appropriate management of such incidents. Our study provides an overview of the risks associated with needlestick and sharps injuries and sheds a light in prevention strategies to protect the healthcare professionals. **Material and Method:** Between January 2015 and September 2017 the reports of the occupational injuries in our high-technology hospital that is located in the metropolitan area with 1200 beds and 3300 healthcare workers were examined. **Results:** One hundred eighty-five occupational exposures were reported. Percutaneous injuries were the most common exposure (87.5%) (161/185). Mucocutaneous exposures decreased from 16%(9/56) in 2015 to 9.4%(5/53) in 2017. Of all injuries, injuries observed in nursing professions was 49.1%. Twenty-two Hepatitis B surface antigen (HBsAg) positive, 12 Hepatitis C (HCV) and 3 human immunodeficiency virus (HIV) positive source exposures were reported. Seroconversion was not observed in workers exposed to the Hepatitis B (HBV), HCV and HIV. Of 185 workers 75 workers (40.5%) reported that they had sustained injuries without a report. The use of self-protective equipment was poor. When the exposure occurred 22% and 90% of the workers were not using gloves and goggles respectively. **Discussion:** The low number of reported exposures suggests that hospital staff are not yet fully informed about possible consequences of their injuries and true number of seroconversion attributable to occupation exposures to HCV and HIV may be potentially underestimated

Keywords

Mucocutaneous Exposures; Needlestick Injuries; Seroconversion

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Introduction

Needlestick injuries are common occupational hazards in the hospital setting that expose healthcare workers to the risk of blood-borne infections such as Hepatitis B (HBV), Hepatitis C (HCV) and human immunodeficiency virus (HIV) [1]. Occupational exposures should be considered urgent medical concerns to ensure timely post-exposure management and administration of HBV immunoglobulin, HBV vaccine, and/or HIV post-exposure prophylaxis.

The risk of acquiring HBV from an occupational needlestick injury when the source is Hepatitis B surface antigen (HBsAg) positive ranges from 2% to 40%, depending on the source's level of viremia [2]. HBV can survive for up to one week under optimal conditions and has been detected in discarded needles [3]. Post-exposure prophylaxis with HBV immunoglobulin and HBV vaccine is effective if provided promptly [4].

The risk of acquiring HCV as a result of an occupational needlestick injury when the source was infected varies from 3% to 10% [2]. Unfortunately, there is no effective post-exposure prophylaxis at present.

The risk of acquisition of HIV from a hollow-bore needle with blood from a known HIV seropositive source is between 0.2% and 0.5% [2]. The risk is increased with the higher viral inoculum, which is related to the amount of blood introduced and the concentration of virus in that blood. Avoiding occupational blood exposures is the primary way to prevent transmission of HBV, HCV, and HIV in health-care settings. The aim of our study was to determine the rate of injuries, to investigate the factors that cause the injuries, and to identify areas in which the prevention program needs improvement, examine the types of exposures, examine the staff involved and collecting data on healthcare workers (HCWs) following significant occupational exposure to HIV, HBV, and HCV in our university hospital.

Material and Method

In this retrospective study, we retrieved all incident reports of our university hospital between January 2015 and September 2017. The outcome data was analyzed using a Statistical Package for the Social Services (SPSS) version 21. Descriptive statistics and chi-square test of independence were used to assess independence or associations between the categorical variations.

Univariate analysis along with 95% CI was calculated to assess factors associated with needlestick injuries. The study protocol was approved by the Ethics Committee of our institution. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Results

Between 2015 and 2017, 185 occupational exposures were reported. Fifty-six exposures were in 2015, 76 were in 2016, 53 were in 2017. Table 1 demonstrates the annual exposures between 2015 and 2017.

Table 1. Annually exposures from 2015 to 2017.

	2015	2016	2017
Occupation			
Nurse	20(36%)	23(30.1%)	13(24.5%)
Doctors	4(7%)	4(5.3%)	0
Cleaning Worker	18(32%)	16(21.1%)	10(18.9%)
Medical student	1(2%)	5(6.6%)	6(11.3%)
Nurse student	6(11%)	14(18.5%)	15(28.3%)
Hospital housekeeping worker	5(9%)	7(9.2%)	3(5.7%)
Ancillary staff (other than nurses and housekeeping worker)	2(3%)	7(9.2%)	6(11.3%)
Procedure Involved			
Injection	5(8.9%)	3(3.9%)	3(5.7%)
Sutures	4(7.1%)	4(5.3%)	3(5.7%)
Blood procedures	13(23.2%)	26(34.2%)	20(37.7%)
Line procedures	10(17.9%)	8(10.5%)	10(18.9%)
Waste disposal	18(32.1%)	30(39.5%)	15(28.3%)
Other	6(10.8%)	5(6.6%)	2(3.7%)
When Injury occurred			
During use of the item	23(41%)	39(51%)	34(64%)
After use before disposal	8(14%)	21(28%)	10(19%)
During or after disposal	25(45%)	16(21%)	9(17%)
Personal equipment use (gloves)	44/56(78.5%)	60/76(78.9%)	40/53(75.4%)

Types of exposures: 87% (161/185) of the reported injuries between 2015 and 2017 were percutaneous injuries.

Percutaneous injuries attributed to hollow bore needlestick injuries increased from 89.3% (42/47) in 2015 to 94% (64/68) in 2016, before increasing steadily to 95.8% (46/48) in 2017. As a percentage of the overall number of reports, percutaneous injuries slightly increased from 83.9% in 2015 (47/56) to 89.4% in 2017 (68/76). Sharp injuries attributed to scalpels declined from 8.9%(5/56) in 2015 to 3.8% (2/53) in 2017. Mucocutaneous exposures accounted for 11.9% (22/185) of all exposures between 2015 and 2017.

Exposures by location and time: Occupational exposures reported in the wards were 40% of all exposures between 2015 and 2017. Reported exposures were 27.6% in intensive care units, 8% (15/185) in operating rooms, 5.4% in the emergency unit (10/185) (Figure 1).

Between 2015 and 2017 reported exposures in the emergency unit increased from 1.8% to 13.2%. Of the all reported injuries, 75% (139/185) of the injuries were between at hours of 08:00 and 17:00. In emergency department two peaks of reporting hours of 18.00–24.00 and 03:00–07:00 were observed. In operating rooms, all exposures (100%) were reported between 08:00 and 16:00. In intensive care units exposures were not time-dependent.

Compliance with standard and safety precautions, contributory factors: Waste disposal workers were the subjects in 27.6%(51/185) of all exposures as consequences of nonadherence to safe disposal of sharps and clinical waste. Twenty-two percent of the HCW did not use gloves also googles and aprons were not used in 90% of the workers in direct contact with blood and/or body fluids.

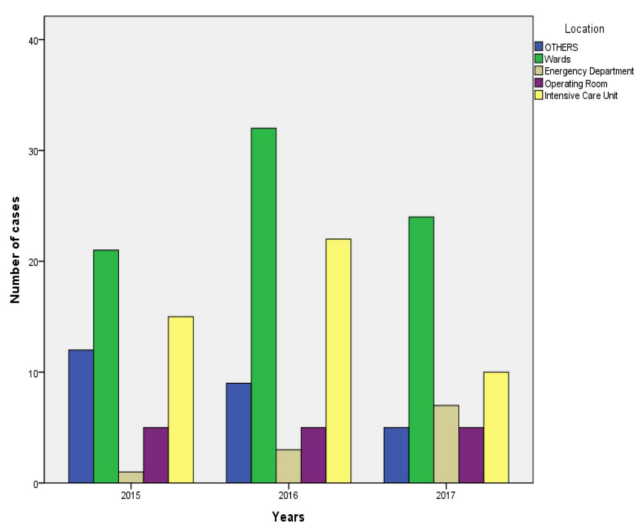


Figure 1. Exposures by location.

HCW's years of experience in the job was categorized into 4 different groups. Group 1 consisted of workers with five years or less experience of the job; group 2 consisted of workers with more than five less than 12 years of experience of the job, group 3 consisted of workers with 12-17 years of experience of job and group 4 consisted of workers with 17-23 years of experience of the job. Of all injuries 62.1% of the injuries, were in workers with five years or less experience in their job (Figure 2). In univariate analysis, odds of having injury was higher among the workers who were: practicing for less than 5 years (OR=6.52, 95% CI: 2.65 – 9.61) ($p < 0.001$).

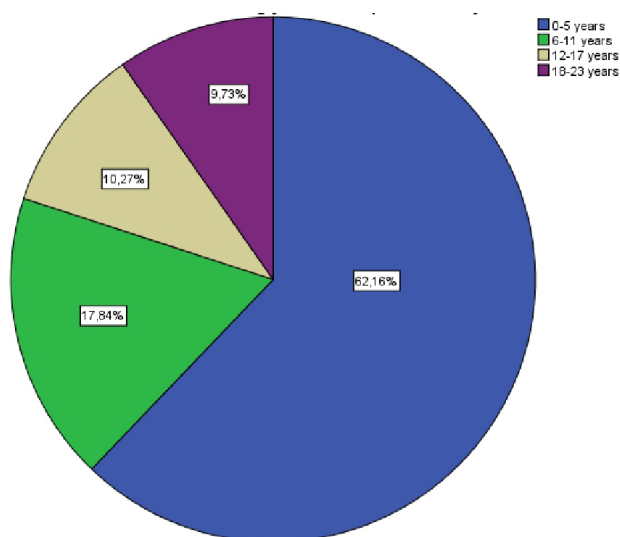


Figure 2. Working experience and percentages of exposures.

Overall, of the percutaneous exposures, 57.8% (93/161) occurred during the procedures, 42.2%(68/161) occurred after the procedure. As a contributory factor non-compliance with standard precautions was reported in 86.7% (59/68) of the exposures after the procedure versus in 70.9%(66/93) during the procedure.

Procedure-related contributory factors which are emergency procedures and procedures that are different from rutin practice were the factors in 16% (15/93) of the exposures during the

procedure. Health-care worker related contributory factors which are inexperience, tiredness, rushing for the procedure was observed in 12% (12/98) during the procedures.

The most common actions taken after needlestick injuries were compression 22.9% (37/161) and washing the area with soap and water 92.4% (171/185).

The source patient: Of 185 exposures reported between 2015 and 2017; 11.9% involved HBsAg (+) source patients, 1.6% involved HIV (+) and 6.5% involved HCV (+) source exposures. Exposures of HBsAg (+) source patients were 3 in the operating room, 3 in the emergency department, 4 in intensive care units, and 12 in the wards. HIV (+) source exposures were 1 in the operating room, and 2 in the wards. HCV (+) source exposures were 1 in operating room, 2 in intensive care units, and 9 in the wards. Seroconversion was not reported due to exposure of HBsAg (+), HCV (+) and HIV (+) source exposure patients. After HIV (+) source exposures all 3 workers completed 28 days post-exposure prophylaxis of antiretroviral therapy.

At the time when the study was conducted, 88.6% workers were fully vaccinated with three dosages of the vaccine.

Discussion

The awareness of the issue of occupational hazards began many decades ago. Although over fifteen years have passed since the standard precautions have been defined and recommended to be taken by all HCWs when they are in contact with patients, it is a fact that they are often neglected [5]. The absence or insufficiency of basic protective equipment such as masks, gloves, and goggles have been reported as barriers to compliance with standard precautions [6-8]. In our reports, the use of personal protective equipment was poor. When the exposures occurred; 22.2% of the workers were not using gloves, 90% of workers were not using goggles and aprons. As in line with our findings, many studies reported the unavailability of personal protective equipment especially at emergency departments [8,9].

Aside from compliance with the use of personal protective equipment we underline the importance of adhering to protocols for the safe handling and disposal of sharps and clinical waste. In comparing contributory factor categories over time exposures involving non-compliance with proper handling and disposal of clinical waste increased from 64% to 80% from 2015 to 2017.

Of the injuries from 2015 to 2017, the contributory factor was non-compliance with standard precautions in 77.6% (125/161) of the percutaneous injuries. These exposures could have been prevented by compliance with well-known but neglected standard precautions. Non-compliance precautions as a contributory factor include not having sharp at hand, overfull sharps bins, clearing, and disposing of sharps used by someone else. As a part of our local protocol, all healthcare workers attend comprehensive training and education programs 2 times every year on a regular basis. Despite adequate local health policies for occupational exposures, underreporting of exposures remains a distinct problem. Evidence from previous studies suggested that needlestick injuries are underreported [10,11]. Underreporting rates of 22% to 82% have been noted [12,13]. Although in our institution an easily accessible reporting system is provided,

40.5% of the workers reported that they had exposure injuries without reports. In our study underreporting rates were 75% in nurses and 50% in doctors and cleaning workers. In a survey of operating room exposures, it was shown that 91% of nurses compared to 53% of surgeons had reported their injuries [10]. In another study, only 2% of injuries were reported by the surgeons [11]. Although most of the injuries were reported in the wards (40%) in our reports from 2015 to 2017, injuries increased in Emergency Department. Performing procedures under emergency conditions may cause the increased risk of injury. A study conducted in the USA reported that psychiatry, pediatrics, and neonatal units had fewer percutaneous injuries than the medical and surgical wards. In our study, the reported exposures in pediatric wards were at the same percentages in surgical wards although less than the reports in medical wards (29.1% (35/120) versus, 41.6% (50/120). This was not statistically different.

As in line with our study, many studies reported that longer work experience was associated with decreased risk of injury [14,15]. It implies that proper training with professionals is needed especially for workers with less experience in their jobs. There were no cases of seroconversion amongst the workers exposed to HBV, HCV, and HIV positive source patients. Our hospital has 1200 beds and 3300 HCW located in the metropolitan area and is a high-technology hospital. Between 2015 and 2017, 185 exposures were reported. Underreported exposures were high amongst the healthcare workers in our hospital. Unknown exposures can lead to transmission of HBV, HIV, and HCV.

Conclusions

Preventing injuries is the most effective way to protect workers. A major proportion of these exposures were attributed to non-compliance with the safe handling of sharps and the disposal of clinical waste, and non-compliance with standard precautions. Comprehensive education, training, and promotion of adherence to standard precautions would reduce the exposures. Even though healthcare workers are actively encouraged to report all injuries, injuries are still under-reported. Under-reporting of injuries is a problem and varies by occupation and specialty. As a consequence of underreported injuries seroconversion to HCV and HIV due to occupational injuries may be underestimated. Due to poor use of personal protective equipment supervisors must reinforce the need to wear personal protective equipment correctly and regularly.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No

animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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